Remarks

Claims 1-3 and 5-12 have been rejected under the judicially created doctrine of obviousness-type double patenting over claims 1-17 of Baker 6,649,316 in view of Elmasry 4,978,598.

The present claims relate to liquid electrophotographic toner compositions having toner particles dispersed in a liquid carrier having a Kauri-butanol number less than 30 mL. The toner particles comprise polymeric binder comprising at least one amphipathic copolymer comprising one or more S material portions and one or more D material portions. As defined in the present claims, the S material portions tend to be more solvated by the carrier while the D material portions tend to be more dispersed in the carrier. Thus, the S material portion of the present copolymer generally corresponds to the "steric stabilizer" of the prior art nomenclature, and the D material portion of the present copolymer generally corresponds to the insoluble "core" of the prior art nomenclature.

The D material portion of the copolymer of the present toner particles, i.e. the less soluble portion, is required in the present claims to have a T_g greater than about 55°C. Further, the claims have previously been amended to specifically recite that the amphipathic copolymer has a total calculated T_g greater than or equal to about 30°C. This claim limitation clearly establishes that the toner compositions as claimed are suitable for electrophotographic processes wherein the transfer of the image from the surface of a photoconductor to an intermediate transfer material or directly to a print medium is carried out without film formation on the photoconductor.

The toners as described herein, through the selection of T_gs of components in the D material portion and additionally in the T_g of the total amphipathic copolymer, surprisingly provide compositions that are particularly suitable for electrophotographic processes wherein the transfer of the image from the surface of a photoconductor to an intermediate transfer material or directly to a print medium is carried out without film formation on the photoconductor. The claimed toner compositions exhibit exceptional storage stability, excellent image transfer, and superior final image properties relative to erasure resistance and blocking resistance. Images made using the compositions of the

present invention are surprisingly non-tacky and are resistant to marring and undesired erasure.

Baker '316 claims a solid phase change developer comprising: (a) a carrier having a Kauri-butanol number less than 30; and (b) an organosol comprising a graft (co)polymeric steric stabilizer covalently bonded to a thermoplastic (co)polymeric core that is insoluble in said carrier. The steric stabilizer of the Baker '316 patent comprises a crystallizing polymeric moiety that independently and reversibly crystallizes at or above 30°C, wherein said phase change developer has an activation point at or above 22°C. The Baker '316 do not render the present claims obvious, even in combination with Elmasry, because A) the presently claimed liquid toner is not an obvious variant of the solid phase change developer as claimed in Baker '316; and B) the presently claimed aspect of T_g of the D material portion of the present copolymer in particular is not obvious from the Baker '315 claims.

A) liquid toner vs. solid phase change developer

As noted in the Baker '316 specification beginning at column 11, line 52, the term "phase change developer" has an accepted meaning within the imaging art. As the term indicates, the developer system is present as one physical phase under storage conditions (e.g., usually a solid) and transitions into another phase during development (usually a liquid phase), usually under the influence of heat or other directed energy sources. Thus, in the system as described in Baker '316, the toner is converted from a solid form to a liquid form prior to development, so that the toner as described first is in the solid form, and then through a specific manipulation is converted to liquid form under image formation conditions so that the actual image formation process is carried out in the form of a liquid. See column 2, lines 21-25. The recitation of this developer system as being a solid phase change material is an essential element of the claims, because this recitation goes to the heart of the operation of the system. Alternative systems, such as set forth in the present liquid toner claims, operation in a different manner and are not obvious variants of the Baker '316 claims.

B) T_g of the D material portion

As noted above, the present claims require that the D material portion of the copolymer of the present toner particles has a T_g greater than about 55°C.

The fundamental operation of the system claimed in Baker '316 requires that the shell have a component that will crystallize to provide a solid at storage temperatures. To compensate for the overall high melting point of the polymer, the core of the copolymer recited in the Baker '316 patent must be selected to exhibit a low Tg, so that the toner can undergo rapid self-fixing. More specifically, Baker '316 describes a toner system wherein the toner is designed to form an image on the surface of a photoconductor with film formation on the photoconductor, which formed film is then transferred to an intermediate transfer material or directly to a print medium. See, e.g. Column 14, lines 64-65, which describes the drying of the film on the photoconductive element surface. Thus, the T_g of the core is selected to be below the temperature of printing or imaging, or below 23°C. See Baker '316 at column 8, lines 20-32. Without this relatively low T_g core, the Baker '318 developer as claimed will not function as described in the specification. The use of a copolymer comprising a D material portion having a T_g greater than about 55°C will destroy the functionality of the system as described in Baker '316.

Elmasry 4,978,598 describes liquid toners for developing electrophotographic images containing dispersed toner particles that are based on a polymer with multi-characteristics. Elmasry at first teaches only the use of low T_g cores in order to provide a latex that will coalesce at room temperature. See column 7, lines 13-15. Elmasry then notes that one can still achieve coalescence of the film at room temperature with a higher T_g core material by manipulation of the stabilizer/core ratio. This reference, thus is directed to a liquid toner system wherein the toner is designed in all embodiments to form an image on the surface of a photoconductor by forming a film on the photoconductor, which formed film is then transferred to an intermediate transfer material or directly to a print medium. See column 25, lines 30-39.

Because Elmasry is directed to a liquid toner that has different T_g requirements from the solid phase change developer of Baker '316, this reference does not add teaching to the phase change developer system of Baker '316. However, even in combination both Baker '316 and Elmasry only relate to toners or developers made from copolymers having a T_g low enough to self-coalesce, i.e. to form a film on the photoreceptor. The Baker '316 claims in combination with Elmasry does not teach or suggest to the skilled artisan the invention of the present claims, which relates to a liquid toner comprising an amphipathic copolymer having a D material portion that has a T_g greater than about 55°C, and wherein the copolymer has a total calculated T_g greater than or equal to about 30°C. Thus, the Baker '316 patent claims does not render obvious a liquid toner composition having the Tgs of the amphipathic copolymer selected so that the toner performs in a manner wherein the transfer of the image from the surface of a photoconductor to an intermediate transfer material or directly to a print medium is carried out without film formation on the photoconductor.

Conclusion

In view of the above remarks, it is respectfully submitted that the foregoing is fully responsive to the outstanding Office action. In the event that a phone conference between the Examiner and the Applicant's undersigned attorney would help resolve any issues in the application, the Examiner is invited to contact said attorney at (651) 275-9811.

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Respectfully Submitted,

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